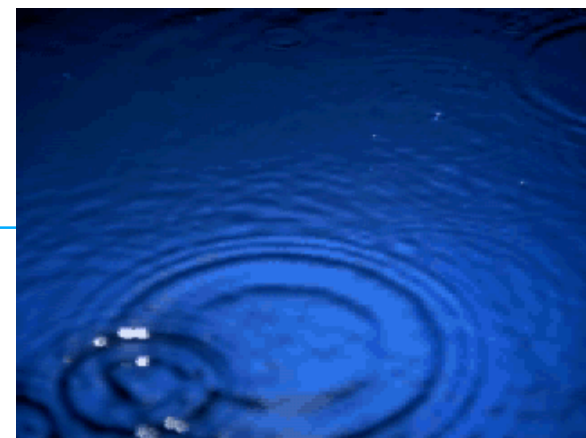


Global Precipitation Measurement

System Definition Review H-IIA Launch Vehicle

December 6-8, 2005



Clyde Woodall 301/286-7114

Clyde.H.Woodall@gsfc.nasa.gov

Goddard Space Flight Center



- ***Launch Mass Allocation Increase from 3000 kg to 3200 kg***



SDR December 6-8, 2005 H-IIA Launch Vehicle

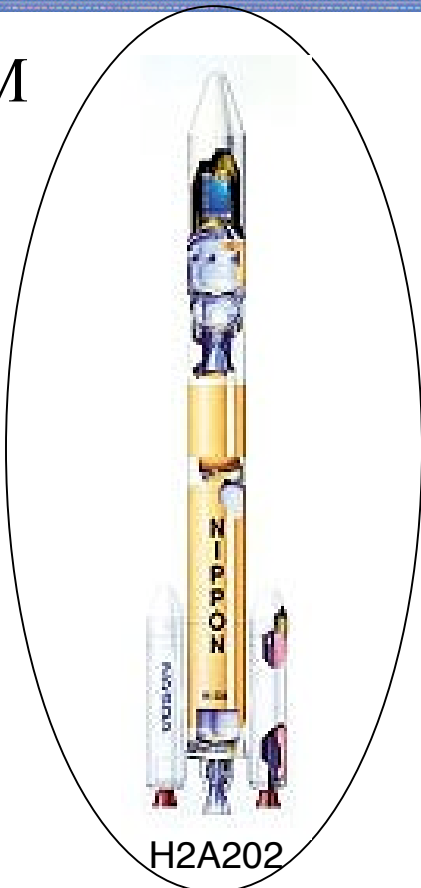
G O D D A R D S P A C E F L I G H T C E N T E R



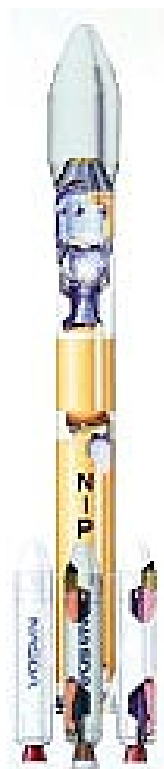
- **JAXA's study on the Launch of GPM**
 - *Signed Formulation MOU with NASA*
 - *“Provide a preliminary plan concerning the launch of the GPM core spacecraft into its low Earth orbit, including definition of proposed mass allocation.”*
 - *Provision of launch vehicle by JAXA is under discussion at JAXA and NASA Headquarters*
 - *Companion payload of GPM*
 - *Due to the launch slip of GPM, GOSAT is not the companion payload*
 - *Companion payload of GPM has not been found yet, mainly due to rare mission orbit ($i = 65$ degree), but JAXA continues the survey of the companion payload*
 - *Program level discussion about launch responsibility of GPM is under way with NASA Headquarters*



GPM



H2A202



H2A204



H2B

- ✓ *The H2A202 vehicle can launch a 4-ton-class payload into geostationary transfer orbit (GTO).*
- ✓ *The H2A204 vehicle can launch a 6-ton-class payload into GTO.*
- ✓ *The H2B vehicle can launch a 7-ton-class payload into GTO.*



SDR December 6-8, 2005 H-IIA Launch Vehicle

GODDARD SPACE FLIGHT CENTER



<i>JFY</i>	<i>Type</i>	<i>Satellite</i>
2001*	H2A202	Test launch
2002*	H2A2024***	MDS-1/DASH
2002*	H2A2024	DRTS/USERS
2002*	H2A202	ADEOS-II
2003*	H2A2024	IGS
2003**	H2A2024	IGS
2005*	H2A2022	MTSAT-1R
2005	H2A202	ALOS
2005	H2A202	MTSAT-2
2005	H2A2024	IGS

2006	H2A204	ETS-VIII
2006	H2A202	SELENE
2006	H2A2024	IGS
2007	H2A202	WINDS
2008	H2A202	GOSAT
2008	H2B	Test launch
2009	H2B	HTV Technology Demonstrator
2010	H2A202	GPM ?
2010	H2A202	GCOM-W
2011	H2A202	GCOM-C

* : Already launched successfully

** : Launch failure

*** : Last number shows the number of Solid Strap-on Boosters (SSB)
(if SSB is not used, this number is omitted)

Note: Current Success Rate is 86 percent (6 successful launches with 1 failure).



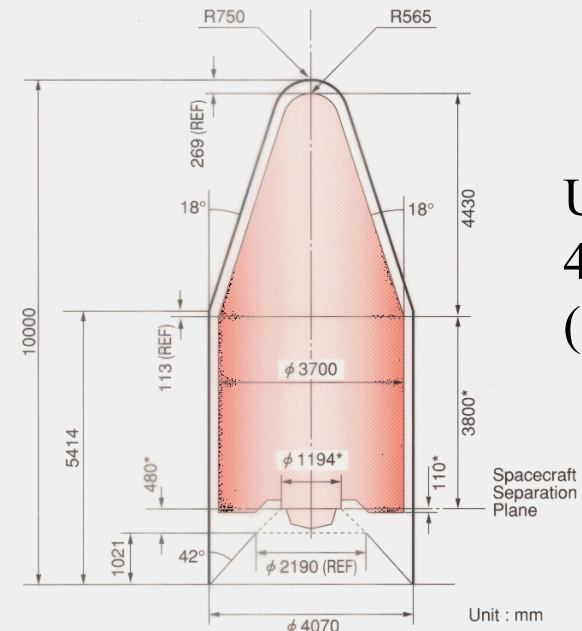
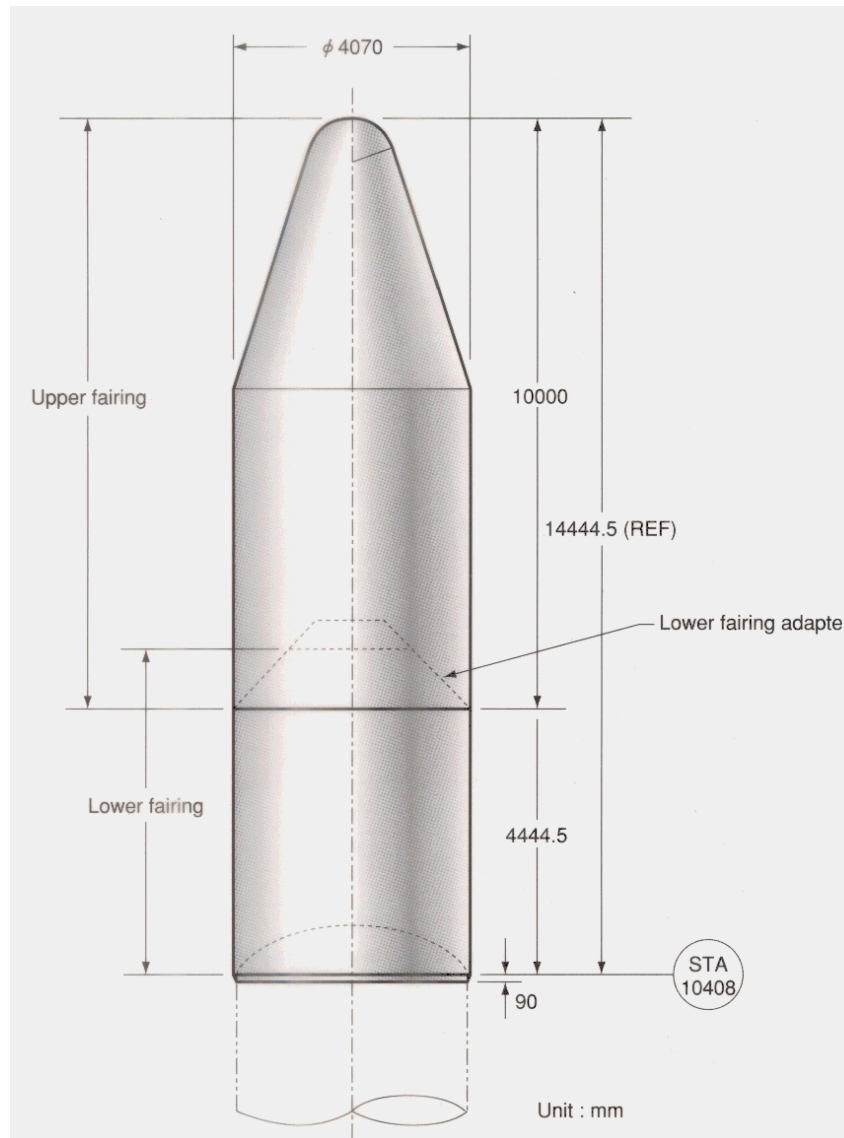
SDR December 6-8, 2005 H-IIA Launch Vehicle

GODDARD SPACE FLIGHT CENTER

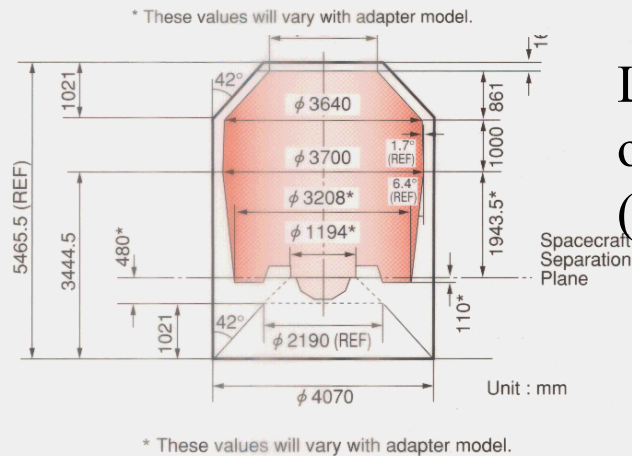


Item	Launch	External			Usable volume		Application
Model		Height (m)	Diameter (m)	Portion of fairing	Height (m)	Diameter (m)	
4S	single	12.0	4.07		10.23	3.7	ETS-VI, COMETS
5S	single	12.0	5.1		9.12	4.6	ADEOS ADEOS-II
4/4D-LS	dual	14.5	4.07	upper	8.23	3.7	TRMM
				lower	3.80	3.7	ETS-VII
4/4D-LD	dual	16.0	4.07	upper	8.23	3.7	None
				lower	5.36	3.7	None
5/4D	dual	14.1	5.1/4.07	upper	6.70	4.6	SFU
				lower	4.68	3.7	GMS-5

Based on H-IIA User's Manual 2nd Ed.

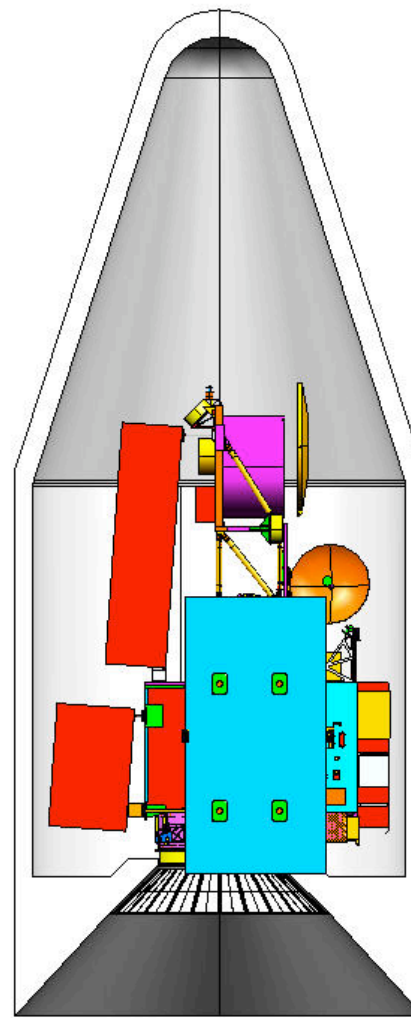
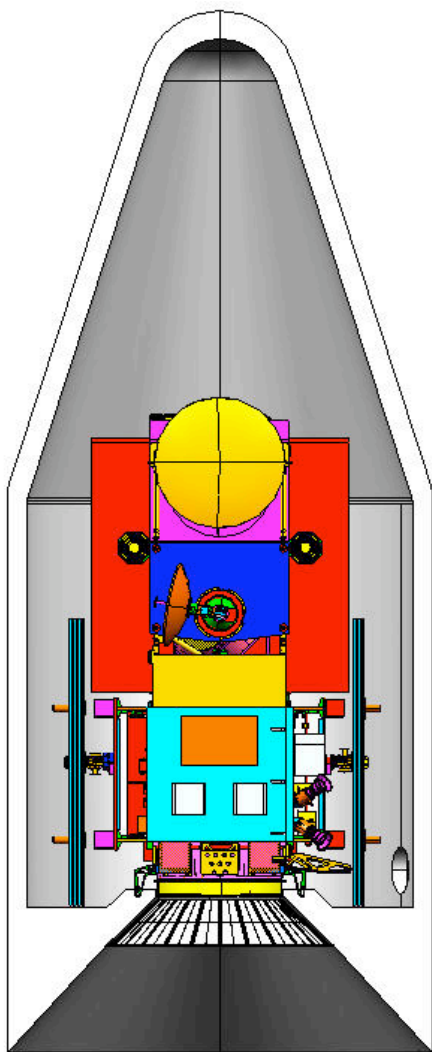


Upper fairing of
4/4D-LS
(for GPM/Core)



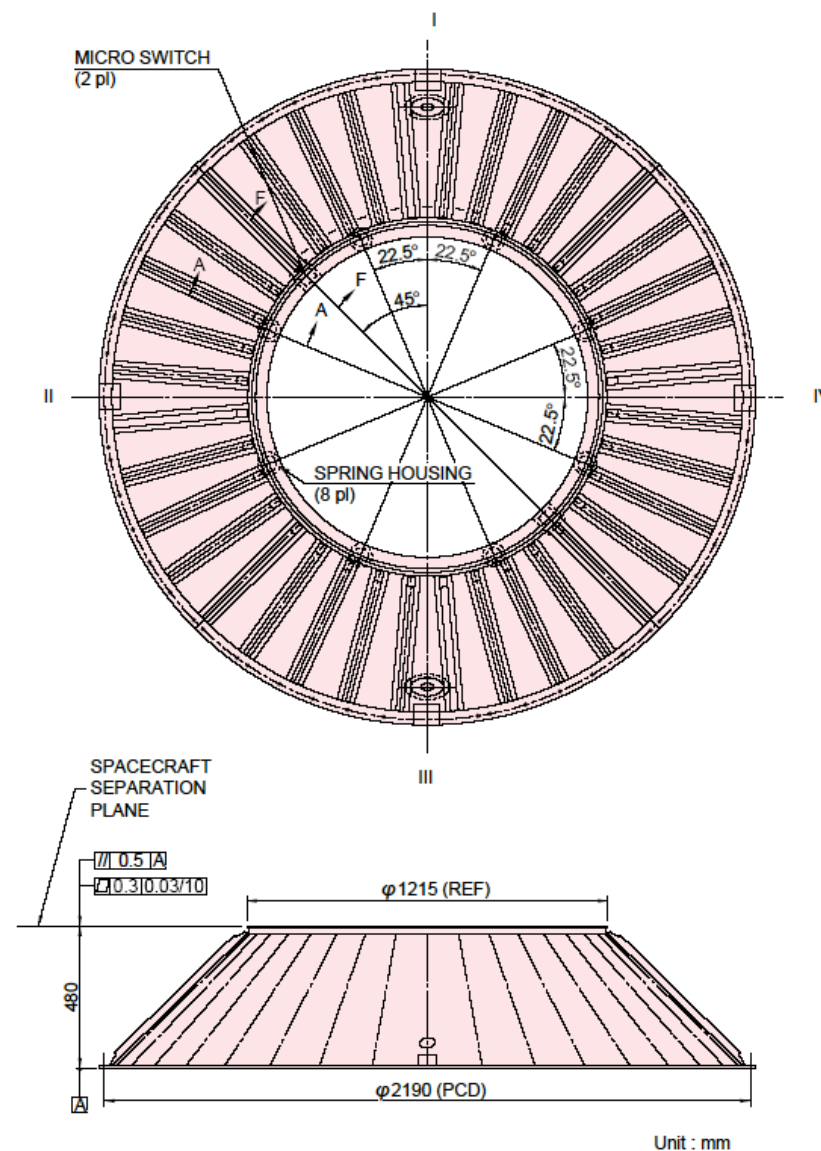
Lower fairing
of 4/4D-LS
(for TBD)





The main characteristics are as follows.

- (1) Interface diameter : 1,215 mm
- (2) Height : 480 mm
- (3) Material : Aluminum semi-monocoque
- (4) Attached system : Clamp bands
- (5) Separation system : 4 or 8 springs
- (6) Clamp band
Maximum tension : 36.8 kN
- (7) Maximum load per spring : 1670 N
- (8) Adapter mass : 100 kg



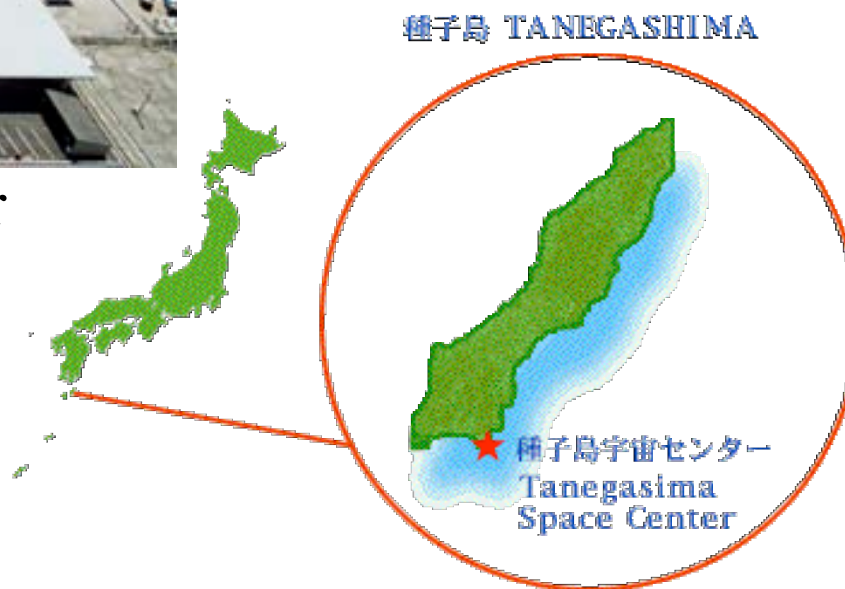
Assumptions Launch: December 2010
 Orbit: 400x650km TBR
 Rocket: H-IIA202-4/4DLS
 Mass of PAF: 100kg x 2

Mass allocation (kg):

Inclination	Companion Payload (TBD)	GPM	H-IIA Capability to Orbit
65 (H2A202)	<1450	3200	4650
65 (H2A2022)	<1800	3200	5000



Tanegashima Space Center



Tanegashima Island



SDR December 6-8, 2005 H-IIA Launch Vehicle

GODDARD SPACE FLIGHT CENTER



- **Preliminary Launch Site Processing Plan**

- 73 actual days at the launch site from the time Observatory arrives to lift-off
 - Nominal 1 shift per day with no weekend work (as feasible)
 - Additional shifts per day and weekends are viewed as contingency
 - Last 7 days are fixed for launch vehicle interaction
 - Delivery of Observatory for encapsulation
 - Transfer of payload fairing stack to VAB to mate to H-2A
 - Final tests and closeouts for payload
 - Launch day



- ***The following have been identified as key documents for the H-IIA/Launch Site interfaces:***
 - *Core Observatory to H-IIA Interface Requirements Document (IRD)*
 - *Generated by NASA*
 - *H-IIA to Core Observatory Interface Control Specification (ICS)*
 - *Generated by JAXA*
 - *Safety Data Packages (SDP) for Phase 0/1, 2, 3*
 - *Generated by NASA*
 - *Program Requirements Document (PRD)*
 - *Generated by NASA*



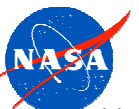
	FY: FY2006				FY2007				FY2008				FY2009				FY2010				FY2011			
	Quarters 1 2 3 4				1 2 3 4				1 2 3 4				1 2 3 4				1 2 3 4				1 2 3 4			
Major Milestones	?¢ Mission PDR				?¢ Mission CDR												?¢ PSR				↑ Core Launch			
System Safety Review	?¢ phase 0/I				?¢ phase II												?¢ phase III							
Launch service contract									Optional Launch Service				Standard Launch Service											



SDR December 6-8, 2005 H-IIA Launch Vehicle



- **Potential Frequency Interference between Observatory and H-2A Launch Vehicle**
 - *Frequencies of Observatory telemetry and launch vehicle telemetry monitored by TnSC tracking overlap*
 - *Study being conducted by both sides to make determination of whether there is an interference issue or not*



Day 1 - December 6, 2005

Location: NASA GSFC B16W-N76/80

Time	Section	Event	Presenter
8:30 AM		Logistics & Announcements	Durning
8:35 AM	1	Introduction	Durning/Ho
8:45 AM		Charge to Review Team/RIDs: Purpose & Review Criteria	Ho
8:55 AM		HQ Overview	Neeck
9:10 AM	2	GPM Mission Overview	Durning
9:55 AM	3	Science Requirements	Hou
10:25 AM		Break	
10:40 AM	4	Mission Requirements	Bundas
11:10 AM	5	Mission Architecture	Bundas
11:55 AM		Lunch	
12:55 PM	6	Systems Engineering Processes	Bundas
1:40 PM	7	System Safety and Mission Assurance	Toutsis
1:55 PM	8	External Interfaces	Hwang
2:10 PM	9	Dual Precipitation Radar (DPR) Overview/Requirements	Woodall
2:55 PM		Break	
3:10 PM	10	GPM Microwave Imager (GMI) Overview/Requirements	Flaming/Bidwell
4:10 PM	11	H-IIA Launch Vehicle	Woodall
4:30 PM		Review Team Caucus	
4:40 PM		End of Day 1	



SDR December 6-8, 2005 H-IIA Launch Vehicle

GODDARD SPACE FLIGHT CENTER

